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New classical macroeconomics as seen by an impressed non-believer or, Keynes and the classics all over again

Visser, H.

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NEW CLASSICAL MACROECONOMICS AS SEEN BY AN IMPRESSED NON-BELIEVER OR, KEYNES AND THE CLASSICS ALL OVER AGAIN

H. Visser

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New Classical Macroeconomics As Seen By An Impressed Non-Believer or, Keynes And The Classics All Over Again

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1. Introduction: the possibilities of stabilization policies

During the nineteensixties activist demand-management policies, broadly called Keynesian policies, were officially adopted by the American government under Presidents Kennedy and Johnson (see Tobin, 1974). It didn't take long for Milton Friedman and other monetarists to attack them. At first the monetarists called their adversaries fiscalists, mistakenly, for the real conflict was not between fiscal and monetary policies but on the question whether activist demand management was useful of not, i.e. on the question of Rules vs. Discretion (cf. the discussion between Friedman and Heller, chairman of the Council of Economic Advisers 1961-'64, Friedman and Heller, 1969, esp. p.47).

Friedman gave the theoretical underpinnings of his anti-activist policy stand in his 1967 presidential address to the American Economic Association (Friedman, 1969). In it he introduced the concept of the Natural Rate of Unemployment (NRU), as an analogue to Wicksell's natural rate of interest. Though NRU is not much else than Keynesian full employment and Friedman's arguments boil down to the idea that the price mechanism functions satisfactorily, not a very new idea either, his article had a tremendous impact. It marked the end of the belief in the trade-off between inflation and unemployment, as embodied in the Phillips curve. In Friedman's view, the Phillips curve is a short-run phenomenon only. Demand management can only exert a temporary influence on real variables, such as employment and real GNP. It does so by deceiving people. Higher aggregate demand drives prices up. Product prices go up faster than factor prices. Employers notice that real wages in terms of their own products fall and want to hire more labour. Employees notice that their wages are rising and do not immediately realize that prices in general are rising also. They are under the impression that real wages have risen and increase their supply of labour (Friedman, 1969, p.103-104). After some time the increase in prices affects expectations and unemployment returns to NRU. There is an initial upward movement along a short-run Phillips-curve, followed by an upward shift of the short-run Phillips-curve. The short-run Phillips-curve

$$\dot{W} = a_0 + a_1/U \qquad (1)$$

was modified by the addition of expectations as an argument:

$$\dot{W} = a_0 + a_1/U + a_2\dot{W}_e \qquad (2)$$

where $\dot{W}$ = rate of change of money wages, U rate of unemployment, subscript e denotes expected values. Instead of W, P (prices) can be used.

Sooner or later, economic agents will adjust their expectations to actual price and wage developments, such that $\dot{W}_e = \dot{W}$ or $\dot{P}_e = \dot{P}$. As the monetarists put $a_2 = 1$, because rational economic agents do not suffer from money illusion, a unique equilibrium value for NRU follows:

$$NRU = - a_0/a_1 \qquad (3)$$

At this value a vertical long-run Phillips curve can be drawn.

A similar, though not identical, analysis was developed by Phelps. With Friedman the supply of labour is a positive function of (perceived) real wages. With Phelps the supply of labour is independent of real wages. Unemployed people do not accept any wage offered by employers, however. They search for the best offer in the market and must weigh off the prospect of finding a better wage offer against the loss of income during the search period. When the government unexpectedly stimulates demand, employers need more employees and are willing to pay better wages. Unemployed people spend less time looking for a job, for it proves now easier for them to see their wishes fulfilled. However, after some time employees realize that the wage at which they agreed to work is lower, relative to other wages, than they expected. They quit and start searching again. Unemployment moves back to its original value (NRU, see Phelps, Introduction in E.S. Phelps, a.o. 1971, for his famous island parable, where workers live on islands and have to row to other islands if they want to collect information on relative wages).

With both Friedman and Phelps unemployment is voluntary. The implication of their analyses is that contractionary policy measures, taken to combat inflation, will only have transitory negative effects on employment. After a short period of time expectations adjust and the

economy returns to NRU. They do not consider the possibility that markets do not function as they should and that the economy remains stuck to the right of the vertical long-run Phillips curve or that destabilizing (multiplier) processes move it furhter and further away from NRU. Policy measures to correct temporary random deviations from NRU are not very useful either, in Friedman's eyes, as they work with long and variable lags and therefore are as likely as not to have their full impact after the deviation has disappeared by itself.

Whatever one may think of Friedman's and Phelps' analysis and its implication that unemployment is voluntary, their idea that people's expectations (price expectations in this case) must be taken account of and that those adjust to actual (price) developments, was a very fruitful one and has been generally adopted by the profession. Friedman and Phelps left some scope for macroeconomic demand management, by exploiting economic actors' lack of full information, that is, by fooling people. As Friedman put it, quoting Abraham Lincoln: 'you can fool all of the people some of the time, you can fool some of the people all of the time, but you can't fool all of the people all of the time' (Friedman, 1976, p.223). If NRU represents a kind of Walrasian equilibrium, which is clearly what Friedman had in mind, then it would be suboptimal to reduce unemployment below NRU anyway.

The adherents of the idea of 'rational expectations', which gained increasing acceptance during the 'seventies, go one step further. They deny that you can fool people at all, at least not systematically. This view gave rise to the New Classical Macroeconomics School, which essentially denies any influence from systematic macro-economic policy on real variables. Its adherents consider the experience of the 1970's after the 1973 oil crisis, where increasing and high rates of inflation went together with increasing unemployment, a concluding verdict on the applicability of Keynesian ideas (cf. Lucas, 1981, p.559-560).

The following is a review of rational expectations and the New Classical Macroeconomics (NCME). Special attention will be paid to the assumption of market clearing and to the reinterpretation of history by NCME adherents.

2. The concept of rational expectations and NCME

In his now famous 1961 article, which was first neglected for a decade or so, Muth proposed that expectations are 'essentially the same as the predictions of the relevant economic theory' (Muth, 1961, p.315). His hypothesis was, more precisely, that 'expectations of firms (or, more generally, the subjective probability distribution of outcomes) tend to be distributed, for the same information set, about the prediction of the theory (or the 'objective' probability distribution of outcomes)' (Muth, 1961, p.316).
Muth argued that, if expectations were not moderately rational, there would be opportunities for economists to make profits in commodity speculation, running a firm, or selling the information to present owners (Muth, 1961, p.330). More generally the appeal of Muth's rational expectations hypothesis (REH) is that it is quite reasonable to suppose that economic agents use all available information in such a way that they are not systematically wrong. People do not have perfect foresight, but errors are not serially correlated. This sets rational expectations apart from adaptive expectations, which lay behind much empirical work on inflation and interest rates and also behind much of Friedman's work. With a continuously increasing or decreasing rate of inflation, adaptive expectations, of the form

$$ {}_{t}x_{t+1} - {}_{t-1}x_{t} = \lambda \, (x_t - {}_{t-1}x_{t}) \qquad 0 < \lambda \leq 1 \qquad (4) $$

${}_{t-1}x_{t}$ is the value of x expected for period t at the end of period $t-1$

would systematically underestimate respectively overestimate the rate of inflation. It is surely to be expected that people will not persist making this kind of error.

It has been argued that REH expects too much of economic agents. They must be a kind of human electronic computer: they have an economic model, know the actual probability distributions which govern the behaviour of the model, believe it to be accurate, know the true coefficients, and know how to solve them. Furthermore, they have a consistent set of forecasts with regard to the future values of the exogenous variables and error terms in the model (Forman, 1980, p.38).

Though there may be something in this (see below, Chapter 9), it is not a definitive objection. We do not have to believe that all economic agents proceed in this way, no more than we have to assume that profit maximizing firms actually evaluate marginal cost and revenue curves. In the words of Begg, if we want to model expectations formation in a model in which information is widely and speedily disseminated, in which reputable forecasts are published, and in which expectations are not systematically mistaken, this can best be done 'as if' agents know the model and perform all the required thought experiments (cf. Begg, 1982, p.30). In passing, I may refer to Machlup's defense of marginal analysis with his famous example of a car driver who has to decide if he will overtake a truck in front of him. Though this driver does not consciously perform all the required calculations as to speed and distance, a theory explaining his behaviour would have to take account of all the relevant factors (Machlup, 1967, p.166-167). In other words, the analysis proceeds 'as if' the driver actually performed all the calculations. For Friedman this idea was the basis of his 'methodology of positive economics' (Friedman, 1953, Part I).

Muth applied the concept of REH to speculative behaviour and to the cobweb cycle. Following Lucas (1972), however, REH has been applied not to individual markets, but to macroeconomic systems. The central question became the extent to which governments can influence real variables by means of macro-economic demand management. REH adherents put forward the idea that macro-economic demand policies have no influence on real variables (an idea that is becoming more qualified). They based this idea of policy-ineffectiveness upon REH coupled with the assumption of continuous market clearing. So here was a renewed attack upon Keynesian demand management, with its underlying idea that markets, especially the labour market, do not always automatically clear. The application of REH, combined with the idea of continuous market clearing, is known as New Classical Macroeconomics (NCME).

NCME can be viewed as a further development of Friedman's doctrine that the Phillips curve is a short-run phenomenon. For NCME there is no short-run Phillips curve, because you can't systematically fool people. Tobin therefore coined the expression 'Monetarism, Mark II'

for NCME (Tobin, 1980a, p.xiii). NCME is meant to reinforce the monetarists' stand against activist macro-economic demand management.

3. Policy-ineffectiveness

The message of NCME is that macro-economic stabilization policies are generally ineffective, with the emphasis on monetary policy. I will now first give the base model used to illustrate the policy-ineffectiveness proposition, then discuss the causes of ineffectiveness, after that tough upon fiscal policy and finally pay attention to superneutrality.

i) The aggregate supply function and policy ineffectiveness

The starting point of models that show policy ineffectiveness is an aggregate supply function of the so-called Sargent-Wallace variety (cf. Minford and Peel, 1981), where deviations of output from some trend, apart from random shocks, can only be caused by divergences between actual and expected prices. A typical formulation is:

$$y_t^s = y_n + a_1 (P_t - {}_{t-1}P_t) + u_{1,t} \qquad a_1 > 0 \qquad (5)$$

where y_t^s = the log of real output at time t
y_n = the log of the natural rate of output, corresponding with NRU
P_t = the log of the price level at time t
${}_{t-1}P_t$ = the price level at time t expected at t-1
$u_{1,t}$ = a serially uncorrelated random disturbance with mean zero.

Essentially, this is a reformulation of the Phillips curve as a supply function: if actual prices correspond with expected prices, unemployment is at NRU and production is at the 'natural' level, apart from random disturbances. The economy is on the long-run, vertical Phillips curve. Deviations only occur because of price surprises, as in the micro-economic approaches of Friedman and Phelps.

Now assume that aggregate demand is established in agreement with the quantity theory:

$$y_t^d = M_t - P_t + u_{2,t} \tag{6}$$

where y_t^d = the log of aggregate demand at time t.
Under the assumption that commodity markets clear, it follows from (5) and (6) that:

$$y_n + a_1 (P_t - {}_{t-1}P_t) + u_{1,t} = M_t - P_t + u_{2,t}$$

or:

$$y_n + (1 + a_1)P_t - a_1 \cdot {}_{t-1}P_t + u_{1,t} = M_t + u_{2,t}$$

and:

$$P_t = \frac{M_t + a_1 \cdot {}_{t-1}P_t - y_n - u_{1,t} + u_{2,t}}{1 + a_1} \quad . \tag{7}$$

From (7) we can construct the value of P_t expected at the end of period t-1 . We start from the assumption that the money supply is a constant or that the money supply grows following a fixed rule, such that ${}_{t-1}M_t = M_t$. Furthermore, note that $E_{t-1}({}_{t-1}P_t) = {}_{t-1}P_t$, where E_{t-1} denotes expectations taken at time t-1 . We find that:

$${}_{t-1}P_t = \frac{M_t + a_1 \cdot {}_{t-1}P_t - y_n}{1 + a_1} \tag{8}$$

(Note that $E_{t-1}(u_{1,t})$ and $E_{t-1}(u_{2,t})$ are by definition zero.)
From (7) and (8) it follows that:

$$P_t - {}_{t-1}P_t = \frac{u_{2,t} - u_{1,t}}{1 + a_1} \tag{9}$$

Substitution of (9) into (5) shows that deviations of output from the 'natural' level are completely random.

Let us now assume that the monetary authorities decide to pursue an activist monetary policy, for instance according to a proportional feedback rule (increasing the money supply when output

lies below the natural level and decreasing it in the opposite case):

$$M_t = M_n + a_2(y_{t-1} - y_n) + u_{3,t} \tag{10}$$

where M_n = the trend value of the money supply, and $u_{3,t}$ is, again, a serially uncorrelated random variable with mean zero, introduced because of the idea that the authorities are unable to completely control the money supply.

The rational expectations hypothesis implies that economic actors will lose little time in discering the policy rule followed by the authorities. Their rational expectation of the money supply in period t at the end of $t-1$ will be:

$$_{t-1}M_t = M_n + a_2(y_{t-1} - y_n) \tag{11}$$

Instead of (6) we get:

$$y_t^d = M_n + a_2(y_{t-1} - y_n) - P_t + u_{2,t} + u_{3,t} \tag{12}$$

and instead of (7):

$$P_t = \frac{M_n + a_2(y_{t-1} - y_n) + a_1 \cdot {}_{t-1}P_t - y_n - u_{1,t} + u_{2,t} + u_{3,t}}{1 + a_1}$$

Using (11) and taking expectations, we find that:

$$_{t-1}P_t = \frac{M_n + a_2(y_{t-1} - y_n) + a_1 \cdot {}_{t-1}P_t - y_n}{1 + a_1} \tag{13}$$

and:

$$P_t - {}_{t-1}P_t = \frac{-u_{1,t} + u_{2,t} + u_{3,t}}{1 + a_1} \quad . \tag{14}$$

Monetary policy according to a rule has no systematic influence on real variables. Economic actors take account of the policy rules followed by the authorities and prices cannot systematically be brought to deviate from expected prices. The monetary authorities can only influence real output and employment by engineering surprise shocks in money growth. One corrollary of this line of thought is that the authorities do in some special

cases have the opportunity to increase real output for a short period, namely if they have followed some rule for the money supply for a long time and unexpectedly change for another rule. If such a move could not be expected by the public, there will be a large initial effect on real output and employment. But it will fade away, and frequent policy changes will fail to delude the public. So there may be a short-run Phillips-curve after all, but it tends to disappear if the authorities want to exploit it (see Lucas, 1973, for empirical research for 18 countries over the period 1951-1967).

In parentheses, it may be remarked that in this kind of models stabilization policies are strictly useless. Deviations of output are serially uncorrelated, so there is no point in taking measures during one period with an eye to disturbances that have occurred one period earlier. Useless or not, policy is ineffective, and it is also impossible systematically to reduce unemployment below NRU. This would be possible with adaptive expectations by continuously increasing the rate of inflation, but would be equally useless provided NRU is seen as representing some kind of optimum.

ii) Where does policy ineffectiveness come from?

In models such as the above only surprise price shocks can move the economy from NRU, that is, from the vertical long-run Phillips- curve. The reason is the very same one as given by Friedman (1969). The microeconomic foundation of Sargent-Wallace-type aggregate supply functions is a Walrasian general equilibrium system. Economic agents are price takers. But the Walrasian auctioneer does not function flawlessly. There is no full information. Suppliers receive information about the prices of their own goods or services (including labour services) faster than they receive information about the aggregate price level. They initially misinterpret surprise increases in the aggregate price level as relative price increases of the goods or services they supply, and therefore increase their supply (cf. Sargent and Wallace, 1975, p.242).

Systematic government policy does not generate unexpected price shocks, provided the government has no superior knowledge about the economy. If the government does have superior knowledge, it can react to deviations before the public discerns them and, therefore, before the public knows of the policy reaction of the authorities. Such policies will then have real results. It has been argued that an informational advantage of the government is improbable, because all relevant information is available to the public without much delay (cf. Grossman, 1980, p.13, Wagner, 1981, p.5). On the other hand, if the government really did have an informational advantage, it could, instead of using it for activist policy measures, make the information available to the public (McCallum, 1980a, p.43). So the case for policy activism, based upon an informational advantage of the government, is weak.

It is not surprising that there is not much scope for stabilization policies in this kind of models. The Walrasian system of equations grinds out a unique equilibrium level of employment, NRU, corresponding to a unique equilibrium level of output. Deviations from equilibrium are either random or caused by false price expectations. Government can only try to discern deviations earlier than the public and try to correct them, or try to fool people, which is suboptimal.
There would be more scope for stabilization policies if there were no continuous market clearing. A promising literature has cropped up on explicit and implicit contracts, where it is argued that it may be rational for economic agents to make multiperiod contracts and to forgo the possibility of making price adjustments for a period of time (see below).

Nevertheless, it has been shown that slight alterations to the model discussed above may be sufficient to restore the effectiveness of stabilization policies, in the sense that they may reduce the variance of output, even under rational expectations. E.g., Minford and Peel (1981a) show that with a Lucas-type supply function, i.e. with the term $(P_t - {}_{t-1}P_t)$ replaced by $(P_t - {}_{t-1}P_{t+1})$, and a lagged value of output added to the supply function, the authorities can reduce the variance of output, at

the cost of increasing the variance of the price level. Unfortunately, theirs is only a mathematical exercise, they do not provide an economic explanation. It seems that there must be some form of lag, which carries disturbances over from one period to the next, and that there must be forward expectations which rule current behaviour and which can be influenced by the authorities. Asako (1982) developed a model where lagged values do not figure, but where current supply and demand depend upon the difference between current prices and expected future prices respectively current money supply and expected future prices, while current prices also are influenced by expected future prices, and vice versa. Expected future prices are dependent upon the money-supply rule and different money-supply rules turn out to result in different values of the variance of output. Incidentally, a Lucas-type supply function is based upon the idea that suppliers of labour substitute present for future labour if perceived current real wages increase relative to expected future real wages (cf. Chapter 5).

So with slight alterations to the basic Sargent-Wallace model, the monetary authorities can influence the variance of output, but not the expected value of output. Shiller has argued that this result follows from the linear nature of the supply function (Shiller, 1978, p.10). If the authorities can influence the variance of the difference between actual and expected prices, and output depends in a non-linear way upon this difference, the expected value of output (its average level) is influenced by the authorities.

iii) Fiscal policy

In cases where monetary policy measures do not have any influence on the probability distribution of output, fiscal policy measures are ineffective too (cf. McCallum and Whitaker, 1979). But this conclusion is not valid for built-in stabilizers. They work automatically, and are not dependent upon an information advantage of the authorities. E.g., tax receipts react immediately to output changes, without anybody having to take action. By varying

the caracteristics of the built-in stabilizers, the authorities can influence variability in output.

Model builders are extremely resourceful. Shiller (1978, p.10-13) has developed a model in which monetary policy is ineffective, but fiscal policy works:

$$y_t^s = y_n + a(P_t - {}_{t-1}P_t) \tag{15}$$

$$y_t^d = b_1 + b_2 r_t + b_3 G_t + b_4 Z_t + u_{1,t} \tag{16}$$
IS-curve

$$M_t = P_t + c_1 y_t + c_2 r_t + u_{2,t} \tag{17}$$
LM-curve

where r = rate of interest,
G_t = government expenditures
Z_t = exogenous variable

By eliminating r_t from (16) and (17), and subsequently y_t from (15), we find for P_t :

$$P_t = J(1 + b_2c_1/c_2)(a \cdot {}_{t-1}P_t - y_n) + Jb_1 + J(b_2/c_2)M_t + \\ + Jb_3G_t + Jb_4Z_t - J(b_2/c_2)u_{2,t} + Ju_{1,t} \tag{18}$$

$$J = 1/(a + ab_2c_1/c_2 + b_2/c_2) \quad .$$

Assuming that Z_t, y_n and ${}_{t-1}P_t$ are known at the end of time t-1, we take expectations:

$${}_{t-1}P_t = J(1 + b_2c_1/c_2)(a \cdot {}_{t-1}P_t - y_n) + Jb_1 + J(b_2/c_2)\,{}_{t-1}M_t + \\ + Jb_3 \cdot {}_{t-1}G_t + Jb_4 \cdot {}_{t-1}Z_t \tag{19}$$

where ${}_{t-1}Z_t = Z_t$.

Subtracting (19) from (18) we find:

$$P_t - {}_{t-1}P_t = J(b_2/c_2)(M_t - {}_{t-1}M_t) + Jb_3(G_t - {}_{t-1}G_t) + \\ - J(b_2/c_2)u_{2,t} + Ju_{1,t} \quad . \tag{20}$$

With known monetary and fiscal policy rules, $M_t = {}_{t-1}M_t$ and $G_t = {}_{t-1}G_t$, barring error terms, so systematic policy is unable to influence production. Nonetheless, Shiller sees a way to modify the model in such a way that budgetary policy does help to stabilize y, even if monetary policy remains powerless. To that end, he reformulates the LM-equation, (17), as follows:

$$M_t = P_t + c_1 y_t + f(r) \qquad (21)$$

where $f(r) = 0$ over a region in the vicinity of an interest rate $\bar{r}$, which means that near $\bar{r}$ money demand is interest-inelastic and the LM-curve runs vertically. The LM-function has now become non-linear. If now movements in Z are large and forecastable, and movements in u_1 are very small, the authorities are able to keep the system on the vertical section of the LM-curve by using G to offset changes in Z. As long as u_1 is so small as not to disturb the system out of the vertical section of the LM-curve, these randon distrubances will only affect r, and not y or P.

iv) Superneutrality

Even if monetary policy is ineffective with regard to stabilization, it may yet influence the long-run growth path of the economy by virtue of the Tobin, or Mundell-Tobin effect (cf. Tobin, 1965, Mundell, 1963, 1971, Chapter 2). An increase in money growth will raise the rate of inflation. This makes holding real capital more attractive relative to holding money. Investment is stimulated and per capita production moves to a higher level. This effect can be included in rational expectations models by making y_t a function of the capital stock, distinguishing between consumption and investment in the aggregate demand (IS) equation and making consumption a function of real balances. In the LM-equation, real balances, ln M minus ln P, then have to be a function of the rate of inflation. A change in (the trend rate of) money growth will then change y_n or the growth path of y_n (cf. Fischer, 1979, Begg, 1982, pp.143-149); see for an analysis of what happens between the announcement and the implementation of a new growth rate of the money supply Boyer

and Hodisch, 1982). Without such a real balance effect there is superneutrality, which means that systematic policy can influence neither short-term movements of real output around trend nor trend growth itself (Begg calls this the Strong Neutrality Theorem, and ineffectiveness with regard to stabilization policies the Weak Neutrality Theorem (Begg, 1982, p.143)).

With fiscal policy, superneutrality will be the exception rather than the rule. Tax rates influence, e.g., labour supply and saving decisions, government expenditures may directly affect the rate of capital formation etc. All this will influence the natural rate of unemployment and the natural level of national income or its growth path. This has nothing to do with cyclical policy, but with changes in microeconomic excess demand functions in the general equilibrium system which determine the equilibrium price and quantity vectors.

4. Policy effectiveness because of the absence of continuous market clearing

If there is no continuous market clearing, there is more scope for stabilizing macro-economic policies. Some form of price stickiness is called for. One way is to introduce contracts, especially wage contracts, that fix prices or wages for a period during which the monetary authorities can react to new information. The public then can perfectly well forecast what policies the authorities will follow, but it is not able to react to these policies, because it is bound by contracts that cover at least two periods. A fine example is the model developed by Fischer (1977a) in which at the end of each period new wage contracts are drawn up for one half of the working population for the next two periods. Another feature of the model is that there is some serial correlation in disturbances, which means that it makes sense for the authorities to react to disturbances with measures that only become effective during the next period.

All kinds of variations are possible. E.g., in Phelps and Taylor (1977) prices and wages are set before the money supply is decided upon, and inventories carry disturbances from one period to the next. This makes countercyclical monetary policy both possible and useful. In cases such as these, it is not true that a fixed money supply rule is optimal when the expectations of the public are rational, nor is it true that monetary policy which follows a feed-back rule is only optimal when the public's expectations are not rational (see for such a proposition Korteweg 1976a, p.500).

The discussion on policy ineffectiveness is still going on, the dust has not completely cleared yet. E.g., one of the most ardent advocates of the idea of policy ineffectiveneness, Bennett T.McCallum, proposed that stabilization policies may be ineffective even if there is no instantaneous market clearing (McCallum, 1977). McCallum modified the model of Sargent and Wallace (Sargent and Wallace, 1975), which consisted of a Sargent-Wallace supply function, an aggregate demand function incorporating the expected real rate of interest, and an LM-equation, by introducing a weak form of price stickiness. The commodity price adjusts to the market-clearing value in any period only if there is a substantial discrepancy between expected and actual market-clearing prices. McCallum finds that countercyclical demand policy has no output effects in this case. In my view, this in no way negates the results of Fischer (1977a) and Phelps and Taylor (1977). The point is that in McCallum's model there is no serial correlation of disturbances. The authorities only react to past disturbances, but as these are not related to present disturbances, their activities are useless. Moreover, it has been argued that McCallum's model presupposes illogical behaviour by businessmen (R.J. Gordon, 1981, p.511). With sticky prices the quantity demanded may diverge from the quantity supplied (in Fischer's model this problem was circumvented by making wages, not prices, sticky). Now if demand management causes demand to deviate from supply, inventories are accumulated or decumulated. Policy ineffectiveness then presupposes that businessmen do not react to inventory changes, which is not very realistic.

This does not mean that no models can be constructed with both policy ineffectiveness and non-clearing markets. One example is the model developed by McCafferty (1982). McCafferty argues that with non-clearing markets (which exist because of the costs of recontracting), the authorities can successfully conduct stabilizing policies only if they have better information than the public or if labour contracts are set in nominal terms for periods longer than the time needed for changes in policy, as in Fischer (1977a) and Phelps and Taylor (1977). The ingenuity of model builders is almost without limits.

5. Business cycles

For some reason or another the opposition of NCME adherents to countercyclical policies is so fierce as to resemble a jihad. Apart from arguing that systematic policy may be ineffective even without continuous market clearing, they have spent a great deal of effort to explain business cycles in a context of continuous market clearing.

If deviations of current market-clearing output or employment from trends are nothing but random fluctuations, equilibrium output or employment itself must show cyclical movements, given the phenomenon of business cycles. One way to explain such movements is to take recourse to exogenous impulses. Technology changes may make marginal productivity schedules, and therefore labour demand curves, move, and changing preference between work and leisure may make the supply curve of labour move. But, as Tobin (1980a, p.37, 1981, p.37) notes, there is no reason why such moves should be auto-regressive (see also Lucas, 1977, p.20). NCME adherents are forced to explain the parallel movement of prices and quantities that characterizes the business cycle from imperfect information (Tobin, 1980b, pp.789-790, Tobin, 1981, p.38, Brunner, Cukierman and Meltzer, 1983, p.281). They have to fall back upon a confusion between changes in price relationships and changes in the general price level, as in Friedman (1969), or a confusion between permanent and transitory shocks, or both, plus some mechanism to transmit disturbances from one period to another. Such a mechanism can be found in time delays in information, costs of

adjusting output decisions once taken or the influence of durable goods or inventories on production during next periods (Laidler, 1981, pp.11-12).

The need to distinguish between (perceived) temporary and permanent price shocks has been stressed by Lucas (1977). Starting from the idea that the supply of labour is not very elastic with respect to real wages, he argued that higher perceived relative wages can only serve to increase the labour supply if labour suppliers believe that the increase will be temporary. In his view, the small premium required to induce workers to shift holidays and vacations is sufficient proof that leisure in one period is a good substitute for leisure in other, nearby periods. Introducing durable goods, Lucas noted that current relative price movements have their maximal effect on capital accumulation when they are regarded as permanent, for investment decisions will not be taken on the basis of price movements that are only believed to be short-lived. Therefore, in order to make both investment and employment move systematically in the direction of relative price movements, such movements must be viewed as a mixture of permanent and transitory relative price changes.

If, because of incorrect price perceptions, investment is increased, there will be a downturn during subsequent periods, because producers want to reduce capacity again and therefore invest less for a time (cf. Lucas, 1975, and Sargent and Wallace, 1975). Adding inventories to the model will give similar results. An unanticipated change in the general price level, interpreted in part as a relative price change, will make firms increase sales and raise both production and sales out of inventory. In subsequent periods inventories are gradually built up again and output will be higher for a time than it otherwise would have been (Blinder and Fischer, 1981, Brunner, Cukierman and Meltzer, 1983, p.283).

Both Lucas (1977, p.23 nt. 15) and Laidler (1981, p.12) have noted the similarity between this kind of models and Austrian business cycle theory. In both, the business cycle is caused by spurious price signals. The difference is, as Lucas noted, that the Austrians stressed interest rates, not product prices. But in both cases the

business cycle is caused by incomplete information, not by market failures. Persistence effects may also be explained by introducing adjustment costs, which includes the costs of bringing the capital stock and inventories back to their equilibrium or trend values. The aggregate supply function then takes the form:

$$y_t = a(P_t - {}_{t-1}P_t) + \sum_{i=1}^{n} b\, y_{t-i} + u_t$$

(cf. McCallum, 1979c, p.241).

The upshot of these 'equilibrium' theories of the business cycle is that demand management policies are useless and that the best that government can do, apart from taking measures in the microeconomic sphere to improve the efficiency of markets, is to stabilize money growth. But neither the explanation of business cycles nor the policy prescription seem to be well-founded.
As R.J. Gordon (1981, p.510) notes, rational economic agents will not rush to place investment orders on the slightest evidence that price relationships change. They will have noticed that in the past price shocks have been erroneously perceived as relative price changes and given the considerable time it costs to draw up and implement investments programmes, they will think it wise to spend some time on collecting information on the character and underlying causes of the price shock.

Another point is that, as models become more complicated, more scope for monetary policies appears to be possible. In Blinder and Fischer's (1981) inventory model, for instance, monetary policy may influence the real rate of interest and with interest-sensitive desired inventories, even fully-foreseen monetary policy will influence real variables.

6. Reinterpretation of history

In equilibrium models of the business cycle, fluctuations in employment are not deviations from NRU, but deviations in NRU, apart from random disturbances. Now some courage is needed to view the unemploy-

ment of the nineteenthirties as voluntary unemployment. NCME proponents, such as Darby and Benjamin and Kochin, do have this courage. Darby argues that the slow recovery of employment in the U.S. during the period 1934-1941, after the shock of the 1929-1933 depression, is a fiction. The data are, in his view, erroneous. During the period 1934 through 1940 five to seven percent of the labour force was employed in public construction works, undertaken with the view to increase employment. These people were officially counted as unemployed, but in fact were not, according to Darby. His main point is that these people would have been employed anyway. If government agencies had not hired them, private industry would have. In other words, the emergency programs 'crowded out' regular employment. This argument rests on the finding that 'there is little empirical evidence in the postwar period that the government spending multiplier is much above zero over such a long period as 2 or 3 years' (Darby 1976, p. 14). But the value of the (real) government multiplier in a near-full employment economy can heardly be anything else than near-zero and gives no clue as to its value in a depression economy. Moreover, even if we accept Darby's calculations, the minimum unemployment rate during the 1934-1940 period, reached in 1937, turns out to be 9.2 per cent instead of 14.3 per cent, and is still extremely high by pre-1980 post-war standards. Add to this that the average wage received by government employees in the emergency relief programmes during the 1934-1940 period was 46.3 per cent of the average private sector wage, not much different from the 48,6 per cent ratio of unemployment compensation benefits to average after-tax earnings in 1971 (R.J. Gordon 1976, p. 195), then it should be clear that unemployment during the 'thirties can hardly be called voluntary, no news to anyone who is not tied to his or her computer terminal. As Modigliani remarked, commenting on a model by Sargent (1976d) for the post-war American economy, where Sargent assumed that large and persistent fluctuations in employment merely reflect corresponding swings in the natural rate itself: 'In other words, what happened to the U.S. in the 1930's was a severe attack of contagious laziness' (Modigliani 1977, p. 6)

A similar analysis to that by Darby for the U.S. has been conducted by Benjamin and Kochin for the U.K. (Benjamin and Kochin 1979a, b). They assert that, if the British unemployment insurance system in the interbellum had been no more generous than it was in 1913, unemployment would have averaged seven per cent instead of 14 per cent (Benjamin and Kochin 1979a, p. 36, 1982 p. 434). Against this it has been argued that the prewar unemployment benefit system was less generous than that of the postwar period, which until recently had much lower rates of unemployment. So the high level of unemployment between the wars cannot have been caused by unemployment benefits alone (Metcalf, Nickell and Floros 1982, pp. 387-393). Moreover, doubt has been expressed as to the validity of Benjamin and Kochin's research methodology (see Ormerod and Worswick 1982, Collins 1982). Also, they overlooked the fact that quite severe 'genuinely seeking work' and 'means-test' clauses were used in the interwar period in Britain, to the effect that those who voluntarily opted for unemployment could not easily qualify for receiving benefits.

7. Empirical testing of rational expectations

There have been a few direct tests of rational expectations. When expectations are formed rationally, the expected forecast error, conditional on any subset of information available when the forecast was made, is zero. Data from direct sample measures of inflation expectations, the best-known of which are those by Carlson and Parkin for the U.K. (Carlson and Parkin 1975), and by the Michigan Research Center and the financial journalist Joseph Livingston for the U.S., consistently under-predict the actual rate of inflation. Pesando (1975), using the Livingston data, defined price expectations as rational if they fully incorporate the information contained in current and past rates of inflation. For econometric testing this implies that expectations must be both efficient and consistent. Forecasts are efficient if one-period forecasts and realizations share a common autoregressive pattern:

$$\dot{P}_t = \sum_{i=1}^{n} a_i \dot{P}_{t-i} + u_{i,t}$$

$$_{t-1}\dot{P}_t = \sum_{i=1}^{n} b_i \dot{P}_{t-i} + u_{2,t}$$

Efficiency requires that $a_i = b_i$ for all i, which means that expectations should be generated by the same process that generates the variable to be forecast. Forecasts are consistent if the multi-period forecasts are obtained recursively, with the rational forecasts being substituted for the as yet unobserved realization of the series. It was found that the information utilized in the 6-month forecasts was not applied consistently to generate 12-month forecasts. The latter showed a large downward bias. In a similar test by Hafer and Resler (1980) efficiency was rejected for 6-month forecasts over the period 1959-1978 (though not for the relatively stable subperiod 1959-1969), but for 12-month forecasts efficiency was not rejected, though they were biased.

In other tests REH did not fare any better. Benjamin Friedman (1980) studied data from quarterly surveys of interest rate expectations, conducted since September, 1969, by The Goldsmith-Nagan Bond and Money Market Letter. Both efficiency and consistency were rejected by the data. Moreover, respondents failed, when predicting long-term interest rates, to exploit efficiently the information contained in data on unemployment, growth of industrial production, inflation and the federal government deficit. Finally, Stein concluded from studies and data on commodity and foreign exchange future contracts that anticipations systematically lag behind subsequently realized prices during periods of rising or falling prices, which points in the direction of adaptive rather than rational expectations (Stein, 1981, pp. 140-141).

It has been argued that information lags and shocks extending over several periods may generate autocorrelated errors, even though the underlying forecasting process is consistent with REH. Ingenious tests based upon this idea have been made, but the results do not seem encouraging for REH (cf Chan-Lee, 1980, esp. pp. 68-70).

And then survey responses do not necessarily reflect the anticipations of actual buyers and sellers of goods and securities.
Apart from direct tests, there can only be joint tests of NRU and RHE. As Buiter (1980, p. 38) notes, the hypothesis appears to be in danger of being consistent with any conceivable body of empirical evidence, because the assumption of optimal use of the available information cannot be tested independently of an assumption about the available information set. By suitable redefinition of the information set conditioning the forecast, any pattern of serial correlation in the endogenous variables of a model can be rationalised as consistent with Muth-rational expectations.

It must be admitted that the claims made by NCME adherents are not always extravagant. Sargent (1976d) tested and estimated a small model for the U.S. for the period 1951-I through 1973-III based upon the idea that unemployment, output and the rate of interest are econometrically exogenous with respect to variables measuring monetary and fiscal policies. Sargent concluded that "the empirical results provide some evidence that the causal structure imposed on the data by the classical model (...) is not obscenely at variance with the data" (Sargent 1976d p. 233). The tests did not convincingly reject the hypothesis that monetary and fiscal policies do no cause unemployment or the interest rate. On the other hand, Sargent found that, in contrast to the NRU hypothesis, money wages played a role in causing unemployment and the long-term interest rate.

A number of tests have been made of the reaction of prices and output to expected and unexpected money growth, respectively. Wogin (1980) estimated a monetary policy feedback rule for Canada for the period 1927-1972 in order to identify the amount of unexpected monetary growth. The systematic component of money growth played no significant role, but the unexpected component had significant negative effects on unemployment, as did federal spending and exports. Similarly, Attfield, Demerey and Duck found for the period 1963-1978 that output in the U.K. economy was affected only by unanticipated money growth, not by the systematic part of money growth. Similar results have been found by Barro (1977a) for the U.S. for the period 1941-1973. The current and two annual lag values of unanticipated money

growth were shown to have considerable explanatory value for unemployment. A later article (Barro 1978) extended these results to output and the price level. Barro found a one-to-one, contemporaneous link between anticipated money growth and the price level, while the price response to unanticipated money supply movements had a longer lag than the output response. Again, Barro and Rush (1980), using both annual data for the 1941-1977 period and quarterly data for 1941-I through 1978-I, found that aggregate output and employment responded to unpredictable money growth but not to predictable money growth. However, the response with quarterly data was different from annual data and the pattern of response of prices to unpredictable money growth did not seem to be consistent with the pattern of response of output. Like Wogin for Canada, Bomhoff (1979, Ch.4) found for the Netherlands over the 1953-1976 period that anticipated money growth determined inflation, whereas unanticipated money growth had a significant influence on the deviation of actual from planned output growth, together with foreign impulses and government expenditure.

Less positive results for NCME came out of research by Driscoll, Ford, Mullineux and Sen (1983) for the U.K. over the postwar period through 1979. They maintain that structural neutrality (the idea that deviations from market-clearing, natural rates of output, employment, etc. occur only because of random shocks or unanticipated policy changes) implies REH, but REH does not imply structural neutrality. Now the likelihood ratio tests of the REH restrictions in their model gave quite negative results, so that both REH and structural neutrality were rejected.

No conclusive answers have been found yet. Even tests that are not negative for NCME don't say much. Many statistical models are compatible with the time series observations (cf Sargent 1976). The danger is, to quote Harry Johnson (1972, p. 51) that 'testing of hypotheses is frequently a euphemism for obtaining plausible numbers to provide ceremonial adequacy for a theory chosen and defended on a priori grounds'. Cases must be studied where changes in policy alter the part of monetary growth that is expected, in order to see whether the relationship with prices and output is thereby affected. In other words, it is necessary to test for the invariance of alternative

models across regimes (cf Cagan 1980, p. 828). An endeavour to identify distinct periods across which changes in the regime of monetary policy occurred, was made by Neftci and Sargent (1978). Such changes were found to have taken place in 1929 and 1964. They then went on to test two models. First a model in which a feedback rule for the money supply minimizes the variance of national income around trend. Such a model will dominate a rule without feedback, such as a constant money growth rule, if the model is invariant across regimes. Secondly, a model was tested in which the behaviour of output is independent of the systematic part of the feedback rule for the money supply. If this model would be invariant across regimes there would obviously be neutrality. Again, the tests were not conclusive, though they seemed to be more negative for policy activists than for neutrality adherents.

A somewhat less comprehensive testing procedure concerns one aspect of NCME, namely that nominal shocks will affect real aggregates if economic agents have incomplete information. Countries with widely fluctuating exogenous shocks then will, according to Alberro (1981, p. 239) have a more vertical Phillips curve as their inhabitants sharpen their instrumental to differentiate between real and nominal shocks. There should be a positive correlation between Phillips curve slopes and the standard deviations of the exogenous shocks, which was corroborated by data of 49 countries over the period 1953-1969, six of which had highly erratic aggregate demands.

The upshot of NCME is that consistent restrictive monetary policies could bring inflation down without much cost in the form of unemployment. Evidence against this proposition is provided by Eckstein (1981), based upon simulations with a large scale model of the U.S., the 800-equation DRI model. He found a very great resistance of factor prices to demand management, mainly because long-term expectations appear to be formed over a period considerably longer than a year (Eckstein 1981, pp. 60-62, 79).

8. NCME and market clearing

Models which contain rational expectations are often characterized by market clearing, though not of the Walrasian tâtonnement type, because the assumption of full information is not made. Markets clear under the usual homogeneity assumptions, expected money is neutral and monetary policy is near-impotent. In general, however, multi-period contracts or lagged variables make the policy ineffectiveness conclusion invalid, as even McCallum (1979c,, p. 242) must admit. But McCallum found support with R.J. Barro. Barro (1977b) argued that contracts which fix nominal wages for more than one period are suboptimal and that there is, therefore, no solid economic rationale for the presumption that this kind of contract is written. There may be, however, a rationale for introducing wage contracts in a model that specifies that quantities will be determined precisely as they would if there were spot markets or fully indexed contracts. Wage contracts in such a case are a kind of insurance policy, with employers guaranteeing employees a certain level of nominal wages for a certain period of time. The volume of employment will always be at the point where the marginal product of labour is equal to the marginal value of time, which then may differ grom the actual real wage level. Employment determination is divorced from perceived monetary shocks in this way and feedback monetary rules would be superfluous and ineffective. Any divergence of actual real wages from the real wage level that would, in a spot market, clear the labour market only has significance for ex post income distribution. Against this Fischer (1977b) argues that Barro-type contracts do not exist in practice. One reason may be moral hazard, as there will be many occasions where it would pay one of the parties not to fulfill their part of the obligation (nl. either to provide labour at less than the equilibrium real wage or to pay more than the equilibrium real wage level). Another reason may be that the costs of writing and monitoring Barro-type contracts are too large. A satisfying theory of wage behaviour does not yet exist (Fischer 1977b, p. 321). Fischer (1977d, p. 204) admits that, if the monetary authorities attempted to exploit the existing structure of contracts to produce behaviour far different from that envisaged when the contracts were drawn up, this would likely lead to the reopening of contracts and possibly to a

new structure of contracts.

There need also be no instantaneous market clearing if there is oligopolistic pricing. With oligopolistic pricing, prices are determined by long-run minimum average costs up to a mark-up reflecting entry-preventing considerations, coupled with some lag in the adjustment of prices to costs. Demand shocks then will first influence output and employment before influencing wages and prices (Modigliani 1977, p. 7). McCallum, however, not easily defeated, refers to the M.I.T. - Penn-Social Science Research Council econometric model of the U.S. where there are oligopolistic pricing and lags in the adjustment of costs into prices. The NCME view on policy ineffectiveness does not hold, but only, as McCallum shows, because of the formulation of the aggregate supply curve, as aggregate supply is not governed entirely by relations among real variables. If this 'defect' is corrected, the NCME view again holds, given rational expectations (McCallum, 1979a). Which does not prove that such an amended model is a fair representation of reality.

Hahn (1980a) has questioned the use of models that essentially preclude a priori the raison d'être for macro-economic policies. Hahn is opposed to the idea that there is a unique Walrasian rational expectations equilibrium to which any actual economy is always tending (Hahn 1982b, p. 104). The rational expectations world is one without quantity constraints (Hahn 1982b, pp. 45-46). But in the real world there are quantity constraints. If unemployed workers offer their labour services below the going wage rate they may still be refused employment. Because of information problems, employers may well rationally prefer to hire at a fixed wage and to ration the jobs that they offer. An expansionary monetary policy can be effective in a quantity-constrained economy even with rational expectations. Economic agents may then well hold that with a higher money stock the demand for goods will be higher. It is then not impossible that there exists a rational expectations equilibrium with higher real income, higher employment, higher cash balances and possibly slightly lower interest rates, with agents correctly anticipating government policy (see also Tobin 1980a, p. 45, and Begg 1982 para 6.4 for a model without continuous market clearing but with rational

expectations and conventional results for stabilization policy). After all, in the real world firms are price setters who set output targets on the basis of expected sales. Deviations of output from trend result from faulty sales forecasts, not from incorrect price expectations (cf Forman 1980, p. 38). The point is that REH-models are essentially one-good-models, that don't allow heterogeneity (see below). Furthermore, in reality there is no all-embracing Walrasian market, but there are many markets, which are interconnected to varying degrees. Decisions made in one market during one period may have consequences for other markets during the next period, and economic agents in any market are constrained by conditions prevailing in other markets. If, e.g., a negative demand shock occurs, suppliers may well know that they should lower their prices, but they cannot count on their own suppliers to lower the prices of the inputs they use. A demand shock therefore first works out in the form of quantity signals and only after a period of time prices will react. The economy is a very complicated system of input-output relations and communication and coordination are costly (Gordon, 1981, p. 526).

There is as yet no theoretically completely satisfying model which explains why some markets (fixprice markets) do not clear instantaneously, while others (flexprice markets) do; at least no elegant model. The solution probably must be sought along the lines set out by Okun. According to Okun, continuous market clearing implies the universality of organized auction markets, which resemble the Walrasian model. But such markets can exist only for products that are standardized and defined so well (at such low cost) that they can be viewed as homogeneous by a prospective buyer placing orders through a broker. Markets for other products, for heterogeneous goods, are search or customer markets. Sellers in these markets are price makers, and therefore quantity takers. A demand shock will initially alter quantities and leave prices unchanged. Sellers have an incentive not to change prices frequently. They have a sort of implicit contract with their customers. Shopping is costly. If customers can be sure of the prices advertised by their suppliers, they will return for repeat buys.

With frequent price adjustments, customers will spend more time shopping around, so it is in the interest of both seller and buyer to enter into an implicit contract. In the same way, it is in the interest of both the employer and the employee to guarantee a certain wage level for some period of time, in spite of Barro. The employer cannot be sure that prospective new entrants are of the same quality and they have, moreover, invested in their employees; for the employees, job search is costly (see Okun 1980, pp. 823-824 and Okun 1981, esp. Ch. 4; see also Hahn 1982d, p. 288). One might ask why there should be no contracts that fix both wages and hours per week worked. Poole (1976, pp. 486-487) answers that such contracts do not contain a mechanism to reallocate labour. Under such contracts firms may therefor offer lower wages than under fixed-wage only contracts. Expected incomes may well be enough higher under fixed-wage contracts than under wages-and-hours worked, or tenure, contracts to persuade most employees to forego the security of tenure. Tenure contracts seem to be more common in Europe than in the U.S. and the conclusion that European employees are more risk-averse than their American counterparts does not seem to be farfetched.

Empirical evidence does indeed suggest that not only wage rates but also home market prices of manufactured products tend to be stable for months or even years at a time. Silberston only sees exceptions to this rule when raw materials with widely fluctuating prices form a high proportion of costs (Silberston 1973, p. 1031).

It can be argued that a monetary economy is characterized by just the properties that neoclassical and monetarist, let alone NCME models leave out, such as information and other transaction costs and economies of scale that preclude perfect competition (cf Miller, Nelson and Supel, 1976, p. 62). Doubt may be expressed as to monetary policy rules developed in the context of what are essentially non-monetary economies (cf Miller, 1976, p. 100). NCME one-good models describe economies where money is non-essential.

9. Critiques of rational expectations

i. Use of the correct model

REH says that economic agents process information according to a correct model of the economy and make unbiased estimates of its coefficients (B.M. Friedman, 1979, p. 38). McCallum (1979c, p. 241) argues that an extreme REH would be that all agents act as if they knew the true structures of the economy including the policy feedback rule. A weaker version is that expectations differ from the fully rational values by a random term uncorrelated with available data. McCallum admits that such an assumption is literally untrue, but then, he says, so is every behavioral relation in every formal economic model. In parentheses, this can be defended as an 'as if' approach, which serves as an economic explanation of empirically found regularities, but which cannot itself be tested (cf Begg, 1982, pp. 130, 254). McCallum sees no reason to believe that such an assumption is terribly inaccurate at the macrolevel. Moreover, the alternatives are unattractive, because they require the assumed existence of some particular pattern of systematic expectations errors. This is improbable. People using the correct model would make profits at the expense of less well-informed people. This should answer the objections voiced by, among others, Kaldor and Trevithick (1981, p. 15) that the assumption of rational expectations presupposes the correct understanding of the working of the economy by all economic agents, which can only be called metaphysics. People using the correct model should outperform less well-informed people. But even if that is true, one cannot be sure that this will drive the system towards a reactional expectations equilibrium, as long as the adjustment mechanism is not given (Maddock and Carter, 1982, p. 45). Meanwhile, firms are not immediately driven out of existence by wrong price forecasts and for consumers the persistent use of poor forecasts will not be disastrous at all (Miller, Nelson and Supel, 1976, p. 57).

Even if the system moves in the direction of a rational expectations equilibrium, such a movement may take a very long time. Now the system is subject to continuous shocks and economic agents need a learning period to discern the true model,

but with continuous shocks one never gets out of the learning period (cf B.M. Friedman, 1979, pp. 24, 36, 39). According to Shiller (1978, p. 39) one may need 15 to 20 quarters after a sudden major change in policy to have enough observations for a regression of any value, when using a number of variables to forecast a particular economic variable. If economic agents subsequently apply their revised expectations mechanism, this in itself changes the structure of the economy again, which brings forth the need for another 15-to 20-quarters learning period.

There may be an even more serious problem. It was assumed all the time that there is a true model of the economy and that there exists a unique rational expectations equilibrium. A true model implies that there exists such a thing as an objective probability distribution of future events. This can only be true if the underlying 'true' model of the economy is constant over time and the economy's behaviour is characterized by repeatability, so that expectation errors are nothing but white noise and there exists only risk, not uncertainty (cf Bausor 1983). The 'true' structure of the system is not independent of expectations; therefore, there is not one, unique 'true' structure. If, e.g., a majority of investors expect that the economy will be buoyant and act on that expectation, the economy will be buoyant, while, if they expect it to go the other way, it will go the other way. In such cases of self-fulfillingprophecies there is no objective probability distribution that can be exploited by people whose expectations are rational. In such a situation we are left with Buiter's opinion that strict Muth-rational expectations can be viewed as an acceptable representation of private (and public) agents' forecasting behaviour only in the tranquility of a long-run steady state (Buiter, 1980, p. 38).

ii. Imperfect information

REH and NCME adherents admit that economic agents may have some information problems. Their use of this fact is somewhat ambiguous. On the one hand, they tend to play down the importance of incomplete information. Much information is easily available from newspapers and magazines, provided by specialized agencies such as government bureaus of statistics.

On the other hand, incomplete information, which is, moreover, unevenly distributed, is often seen as a cause of economic fluctuations. As Okun (1980, p. 819) rightly observes, firms and households operate in both product and factor markets at essentially the same time and it is implausible that important information would be too costly for rational agents to acquire.

iii. Non-uniqueness

It has been argued above that there may be no unique rational expectations equilibrium. Self-fulfilling prophecies cannot be excluded (Fischer, 1979, p. 248). Mathematically, rational expectations models often involve difference equations, which, if not degenerate, have an infinite number of possible solutions. For instance, today's price of a good as well as today's expected price may depend not only on today's money supply, but also on the expectation of tomorrow's price, ${}_tP_{t+1}$.. Next period's price then depends on next period's expectation of price two periods hence and next period's money supply, and so on. The solution depends on expectations of variables for all periods to infinity (cf Shiller, 1978, pp. 23-25). It may be true that, as McCallum (1983) notes, non-uniqueness is not properly attributable to REH, but is a general feature of dynamic models involving expectations, but that does not really solve the problem.

Non-uniqueness may also arise from money being neither neutral nor super-neutral. Usually, demand and supply of real variables are supposed to be homogeneous of degree zero in the money supply and current and expected prices. With homogeneity of degree zero economic agents can safely predict prices to be proportional to the expected money stock, or inflation to be proportional to the expected rate of growth of the money supply. But the neutrality supposition is quite strong (cf Visser, 1980, pp. 185-189). In an economy with internal debt denominated in money, changes in the price level may have non-neutral distribution effects. Inflation may lead to a higher capital intensity because of the Mundell-Tobin effect, which may cause higher wages and a concomitant increase in the labour supply.

All this makes monetary policy, even if foreseen, non-neutral and impairs the uniqueness proposition (cf Hahn, 1980a, p. 2, Hadjimichalakis, 1982, p. 396).

10. Positive contributions of REH

As with any new and seemingly useful concept, extravagant claims have been made for REH. The role of rational expectations in economic theory must be much smaller than claimed by the like of McCallum. It remains, none the less, a useful concept. First of all, there are markets that in effect function like Walrasian auction markets. Markets for financial assets and future markets for agricultural commodities and primary metals are as close as possible to the textbook case of competitive, atomistic markets. They are characterized by relatively small transactions and storage cost, highly standardized commodities and, therefore, negligible information costs, and a large number of market participants.

Furthermore, REH focuses attention on the change in behaviour brought about by government policy measures. Economic agents will, e.g., expect inflation and act accordingly if the government follows expansionary policies. This means that parameter estimates derived under old policies are inappropriate in simulating new policies, because account must be taken of the reactions of economic actors to policy changes,

11. Conclusions

NCME, that is, the combination of REH with continuously clearing markets, is an artifact which is not of much help in analysing the real world. For one thing, it denies the possibility of involuntary unemployment. This is simply counterfactual. As Tobin remarks: 'Why do people report themselves as unemployed if all that has happened is preference for leasure at ruling real wages?' (Tobin 1980d, pp. 42-43). In fact, it describes an economy where money is inessential. In a full-equilibrium NCME-economy, with a complete set of future markets, there is no reason for money to exist (cf. Hadjimichalakis, 1982, p. 390).

NCME assumes away all the real-world problems studied by Keynes, which follow from the less-than-perfect coordination of the decisions of economic agents, i.e. the absence of the Walrasian auctioneer.

REH in itself is less objectionable. It neglects the fact that we live in a world of nonrepetitive events, for which there simply does not exist a probability distribution. In other words, we live in a world characterized not by risk, but by uncertainty, by Keynes's 'dark forces of time and ignorance' (cf Kregel, 1981, p. 570, Lucas, 1977, p. 15, Keynes, 1936, p. 161). It is, however, a useful approximation of some kinds of markets and may even be combined with non-clearing markets. But even in those cases the empirical evidence is not altogether positive. Arrow (1982, p. 4) notes that there are quite sizable price fluctuations on future and securities markets. In his view prices should, if participants behaved rationally, change only when there is new information, and the change on any one day should be small, as most new information adds only a little to existing information. Moreover, he cites evidence from psychological experiments conducted by A. Tversky and D. Kahneman (Arrow, 1982, p. 5) which shows that people judge the likelihood of a future event by the similarity of the present evidence to it. There is a tendency to ignore both price information and the quality of the present evidence (e.g., size sample) and to underestimate uncertainties. So there may be a useful, though limited, role for REH, but NCME must, in my view, be rejected.

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